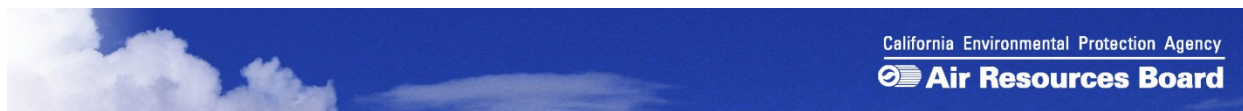


June 17, 2013

## **News Media Digest**

# *Black Carbon Emissions Reduced by ARB Regulations*

Prepared by the Office of Communications



**NEWS RELEASE**

**California's efforts to clean up diesel engines have helped reduce impact of climate change on state, study finds.**

June 13, 2013

SACRAMENTO - Reductions in emissions of black carbon since the late 1980s, mostly from diesel engines as a result of air quality programs, have resulted in a measurable reduction of concentrations of global warming pollutants in the atmosphere, according to a first-of-its-kind study examining the impact of black carbon on California's climate.

The study, funded by the California Air Resources Board and led by Dr. Veerabhadran Ramanathan of the Scripps Institution of Oceanography at the University of California, San Diego, estimates that reductions in black carbon as a result of clean air regulations were equivalent to reducing carbon dioxide emissions in California by 21 million metric tons annually or taking more than 4 million cars off California roads every year.

"We know that California's programs to reduce emissions from diesel engines have helped clean up the air and protect public health," said ARB chairman Mary D. Nichols. "This report makes it clear that our efforts to clean up the trucks and buses on our roads and highways also help us in the fight against climate change."

Black carbon — tiny soot particles released into the atmosphere by burning fuels — has been linked to adverse health and environmental impacts through decades of scientific research. It is also one of the major short-lived contributors to climate change. The major sources of black carbon in California are diesel-burning mobile sources, residential wood burning in fireplaces and heaters, agricultural burning and wildfires.

The 3-year-study, titled "Black Carbon and Regional Climate of California," was conducted by UC San Diego and the U.S. Department of Energy's Lawrence Berkeley National Laboratory and Pacific Northwest National Laboratory. It is the first comprehensive regional assessment of the climate impact of black carbon on California. In conducting the study, scientists used computer models and air pollution data collected by aircraft, satellite and ground monitors.

The study's results support a growing body of scientific evidence that suggests it is possible to immediately slow the pace of climate change regionally by reducing emissions of short-lived climate pollutants, like black carbon.

According to co-author Dr. Tom Kirchstetter of LBNL, black carbon levels have decreased by about 90 percent over a 45-year period, beginning with the establishment of CARB in 1967, mostly as a result of state regulations for diesel engine emissions.

Researchers found the state's efforts to reduce diesel emissions to have lessened the impact of global warming on California, supporting earlier theoretical computer modeling by Dr. Mark Jacobson of Stanford University that reducing black carbon from diesel combustion is a potent 'climate cooler.'

The reductions occurred during a time when diesel fuel consumption increased by about a factor of five, attesting to the effectiveness of CARB regulations requiring cleaner fuels and vehicle technology.

The study took a conservative approach in examining the impact black carbon has on the Golden State. Researchers considered emissions only from diesel-powered trucks and buses, and off-road diesel equipment and vehicles to estimate the equivalent reduction of carbon dioxide.

When all sources of black carbon emissions from diesel fuel combustion are considered, including farming and construction equipment, trains and ships, the reduction in carbon dioxide emissions can be as high as 50 million metric tons per year over the past 20 years. That's roughly equal to a 13-percent reduction in the total annual carbon dioxide emissions in California.

As ARB's current efforts to clean up trucks and buses move forward, resulting in the continued cleanup and turnover of older heavy-duty diesel vehicles, California should continue to see declines in particulate matter emissions. Advanced engine emissions control systems and filters are expected to dramatically reduce emissions from all new diesel engines. Current diesel truck engines, for example, are over 90 percent cleaner than models from years when they were unregulated.

"If California's efforts in reducing black carbon can be replicated globally, we can slow down global warming in the coming decades by about 15 percent, in addition to protecting people's lives," Ramanathan said. "It is a win-win solution if we also mitigate carbon dioxide emissions simultaneously."

Black carbon has the effect of warming the atmosphere because it is effective at absorbing sunlight. However, it is emitted together with a range of other particle pollutants, including organic carbon, sulfur and other chemicals, some of which have a cooling effect, typically by reflecting sunlight. Reducing diesel emissions can therefore lead to a reduction of both warming and cooling particles. The report, however, is the first to confirm, based on both observations and computer modeling, that the warming effect of black carbon dominates, overwhelming any cooling effect of other pollutants. This confirms the positive impact reducing diesel emissions has on fighting climate change.

Other findings include:

- The study found evidence to link brown carbon — a form of organic carbon aerosols — to warming. Therefore, a commonly held view that organic particles from wildfires

primarily reflect sunlight, and cause cooling, was not supported by the study.

- A finding that black carbon particles increased the number of drops of water in clouds, while decreasing the size of those drops, a condition that can reduce or delay rain.

Editor's note: A copy of the report can be found here:

[http://www.arb.ca.gov/research/single-project.php?row\\_id=64841](http://www.arb.ca.gov/research/single-project.php?row_id=64841)

Posted: <http://www.arb.ca.gov/newsrel/newsrelease.php?id=444>

###

# San Francisco Chronicle

## Emission cuts lead to cleaner Calif. Air

BY Peter Fimrite – June 13, 2013

Cuts in diesel emissions have drastically reduced the amount of pollutants in the air that cause global warming in California, potentially valuable information in the fight to save the world's climate from a predicted catastrophe, a study by [University of California](#) and government researchers said Wednesday.

The study found that regulations limiting emissions from diesel-powered trucks, buses and off-road vehicles have taken the equivalent of 4 million cars off California roads every year since the late 1980s.

"We are all breathing cleaner air because of regulations in diesel combustion, but this study shows there was a huge co-benefit of mitigating climate change," said the lead researcher, [Veerabhadran Ramanathan](#), a scientist with the [Scripps Institution of Oceanography and UC San Diego](#). "I'm now very, very interested in taking this message to the rest of the planet, because if the California experience can be replicated around the world, then we can make a substantial dent in climate change."

The study, paid for by the [California Air Resources Board](#), was the first regional assessment of the effect on the atmosphere of black carbon, the soot particles from burning diesel fuel. Black carbon is the primary ingredient in smog, the clouds of soot that for decades turned the air in Los Angeles and other places brown.

Besides causing health problems, black carbon has been identified as the second-largest contributor to global warming behind carbon dioxide.

Tailpipe emissions have been regulated in California since 1967, when the Air Resources Board was established. Diesel truck engines today are about 90 percent cleaner than the models used before emissions were regulated.

Ramanathan and his team of researchers from UC Berkeley, the [Lawrence Berkeley National Laboratory](#) and the [Pacific Northwest National Laboratory](#) in Richland, Wash., analyzed measurements of black carbon taken from aircraft, satellites and ground monitors dating back to the 1980s, and used a computer model to compare them with emission-reduction regulations that the state issued over the years.

Ramanathan said the reductions in warming pollutants were much more dramatic than expected. The clean air regulations, he said, removed the equivalent of 21 million tons a year of carbon dioxide from the atmosphere - the amount spewed by 4 million cars.

Over the past 45 years, the total level of black carbon in California's air has decreased about 90 percent while diesel fuel consumption has quintupled, according to the study.

The findings could serve as ammunition for the state as it moves forward with plans to stiffen emissions rules for trucks and buses. Engine emissions control systems and filters are being developed that could reduce exhaust pollution even further.

"The message, particularly for metropolitan areas in California, is that if you clean up the air to improve air quality you will also protect climate," Ramanathan said. "It is a hopeful message because, in the area of climate mitigation, we have gotten into a funk. But now we know we can do something about it."

Posted: <http://www.sfgate.com/science/article/Emission-cuts-lead-to-cleaner-Calif-air-4597607.php>

###

# The San Diego Union-Tribune.

## **STUDY: STATE RULES HAVE CUT BLACK CARBON**

BY Deborah Sullivan Brennan – June 13, 2013

State diesel rules aimed at improving public health have also reduced levels of black carbon, a potent contributor to climate change, according to a new report commissioned by the California Air Resources Board.

The study was led by Veerabhadran Ramanathan, a professor of climate science at the Scripps Institution of Oceanography in La Jolla who collaborated with the Department of Energy's Lawrence Berkeley National Laboratory and the Pacific Northwest National Laboratory in Richland, Wash.

California has targeted diesel pollution for decades, including a series of measures starting in 2000. One of the most controversial diesel mandates was approved in 2008, focusing on diesel-powered trucks and buses, as part of a sweeping set of regulations designed to meet federal air-quality standards and cut down on cases of respiratory illness and premature death. Supporters have hailed it as a major tool for battling asthma and cancer, while opponents have said it's an overly aggressive measure that has cost many jobs.

Ramanathan and his colleagues said their conservative estimate shows the diesel requirements may slow climate change by curbing the equivalent of 21 million metric tons of carbon dioxide annually. That's about the same as taking more than 4 million vehicles off the road every year, the report concluded.

"Diesel is a toxin and is high on our list of dangerous emissions, so we're really getting a global warming benefit as well as a public health benefit as a result of reducing diesel exhaust," said San Diego County Supervisor Ron Roberts, who has also served on the Air Resources Board during its years of discussion about diesel pollution.

There's general consensus among scientists that the Earth's climate is warming and that fossil-fuel combustion is likely the leading cause. While carbon dioxide is the main contributor, black carbon produced by diesel exhaust and other emissions is No. 2, Ramanathan said.

His globe-trotting work, from China to California, has examined short-lived greenhouse compounds including black carbon, which lasts two weeks in the atmosphere, compared to carbon dioxide, which can persist for centuries. So cutting diesel emissions can swiftly reduce the rate of climate change, he said. “If this can be replicated worldwide, we can reduce projected global warming by as much as 15 percent over the next 30 years,” Ramanathan said.

The Air Resources Board commissioned the report through a competitive-bid process, selecting Ramanathan and his collaborators.

To conduct the study, Ramanathan said, the scientists examined decades of black-carbon measurements. “From the 1980s, black carbon had come down 50 percent,” he said. “Since the 1960s, the amount of soot we put out came down by 90 percent.”

Diesel use rose three- to four-fold during the same period, he said, but improved fuel formulations and engine filters slashed the amount of black carbon emitted.

Early on, concentrations of black carbon dropped in California because of state rules controlling tailpipe emissions and the burning of trash and coal, said Melanie Turner, a spokeswoman for the board. Upcoming phases will address diesel exhaust from agricultural equipment, she said.

When the Air Resources Board voted unanimously in 2008 to adopt the diesel rules pertaining to diesel-powered vehicles, it sided with the agency’s research and a history of past studies by others linking diesel pollution to various health problems.

At the time, advocates of the regulations said the mandate to replace or retrofit up to 1 million trucks and buses would prevent tens of thousands of asthma cases and save up to \$68 billion in lost work days during the next 15 years.

Industry officials didn’t dispute the health connections, but said the state’s actions were extreme because they didn’t adequately account for the economic impact on a wide range of businesses that use diesel-powered vehicles, from beekeepers in North County to long-haul truckers based in the San Joaquin Valley. They pointed to a widely agreed-upon projection that the rules would cost industry an estimated \$5.5 billion by 2023.

The divisiveness grew about a year later, when the agency confirmed that the lead author of internal research about diesel pollution’s effects on public health had exaggerated his academic credentials. That individual was demoted but the Air Resources Board stayed its course, saying the fundamental health analysis remained sound.

Diesel technology pioneered in California could be readily adopted by industrialized nations, pollution experts said, but may be harder to introduce in developing countries, which rely on less-efficient diesel-fueled cars and motorcycles.

“In developing countries, it’s always more of a challenge,” said Michel Boudrias, a professor of marine science and environmental studies and director of sustainability for the University of San Diego.

The equipment comes at a price, adding about \$10,000 to the \$100,000 price tag of a big-rig truck, said Allen Schaeffer, executive director of the Diesel Technology Forum, a trade organization based in Washington, D.C.

Such an expense is still less of a barrier than the availability of the right fuel, he said. New filters require more refined diesel formulations that aren’t found in developing countries, he explained. “The technology is widely available in the U.S. and available for export, but it’s very difficult to achieve the gains we’ve had in the U.S. without cleaner fuel,” he said.

Despite disagreements about global feasibility and economic hardships, Dave De Haan, a University of San Diego chemistry professor who has researched particulate pollution, said the new report leaves little doubt about the need to rein in diesel emissions.

“This study was kind of a third strike against burning diesel in engines without emission controls,” he said.

Posted: <http://www.utsandiego.com/news/2013/Jun/13/tp-study-state-rules-have-cut-black-carbon/>

###



## **Calif. cut black carbon 90%, helping to slow climate change -- study**

BY Anne C. Mulkern – June 13, 2013

California's rules on diesel emissions have significantly cut black carbon, one of the pollutants most blamed for climate change, according to a study funded by the state's Air Resources Board.

The research from the Scripps Institution of Oceanography at the University of California, San Diego, estimated that black carbon levels were slashed 90 percent over



45 years. The result is equivalent to taking more than 4 million cars off Golden State roads every year.

"We know that California's programs to reduce emissions from diesel engines have helped clean up the air and protect public health," said Mary Nichols, chairwoman of the Air Resources Board (ARB). "This report makes it clear that our efforts to clean up the trucks and buses on our roads and highways also help us in the fight against climate change."

The study was published in the *Proceedings of the National Academy of Sciences* and the *Atmospheric Environment* journals. It arrives as ARB is looking at new rules on black carbon and other short-lived climate pollutants like methane, said Stanley Young, agency spokesman.

"That is going to be an area of major policy in the future, short-lived climate pollutants," Young said. There are no specific proposals yet, but "that is the direction that we're moving in."

Black carbon, made up of tiny soot particles, is a pollutant from sources that include diesel engines, said Veerabhadran Ramanathan, lead researcher and distinguished professor of climate sciences at UC San Diego. It is the second biggest contributor to climate change behind carbon dioxide emissions.

Black carbon is particularly dangerous, he said, because it traps sunlight and therefore heats up the air. It contrasts to organic carbon, sometimes called white carbon, that allows sunlight to hit the ground and bounce back, he said.

During the 45-year period the study examined, the Air Resources Board enacted a series of regulations on diesel emissions. Researchers found the state's effort to cut diesel pollution has lessened the impact of global warming in California, ARB said.

### **A quicker fix that could spread**

Scientists believe that quickly cutting black carbon could slow climate change, Ramanathan said. Carbon dioxide emissions from fossil fuel combustion are the biggest contributor to global warming, he added, and accumulate while lasting for centuries. Black carbon, in contrast, is short-lived.

"Slowing down global warming, we would accomplish that sooner by cutting down black carbon in addition to reducing carbon dioxide," Ramanathan said.

California adds about 30 billion tons of carbon dioxide to the atmosphere each year, Ramanathan said, but the regulations on black carbon prevent 21 million tons of emissions.

"Every drop in the bucket counts," he wrote in an email. If the rest of the world replicated California's diesel black carbon policies, "it will reduce the warming trend by 15 percent, which will become noticeable."

The reductions in black carbon found in the study came during a period when diesel use grew by a factor of five, ARB said.

Ramanathan said that is because of restrictions including the state's switch to low-sulfur diesel and car filters that trap black carbon and improve combustion efficiency. A diesel vehicle in California now cannot be bought without those filters, he said.

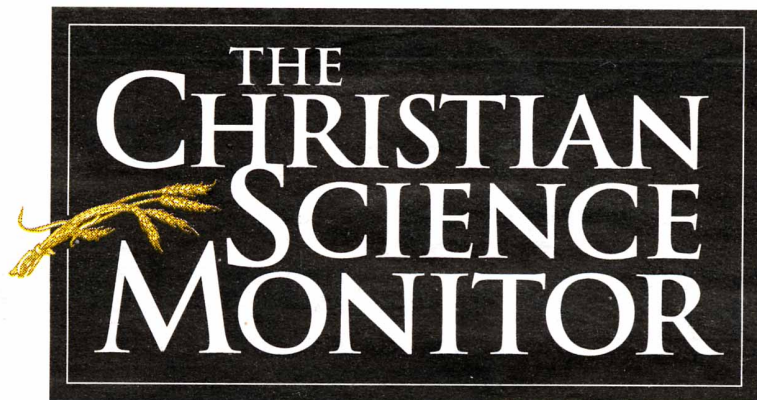
The study looked only at emissions from diesel-powered trucks and buses, and off-road diesel equipment and vehicles, ARB said. If all sources of black carbon emissions from diesel fuel combustion were considered, including farming and construction equipment, trains, and ships, "the reduction in carbon dioxide emissions can be as high as 50 million metric tons per year over the past 20 years." That roughly equals a 13 percent reduction in the total yearly carbon dioxide emissions in the state.

The findings on black carbon reduction were separate from what the study initially set out to investigate. ARB, Ramanathan said, put out a request for proposals to look at the effect of black carbon on the environment.

Posted:

<http://www.eenews.net/climatewire/stories/1059982766/search?keyword=black+carbon>

###



## **Study raises hope of combating global warming by reducing soot**

BY Pete Spotts – June 13, 2013

Between 1989 and 2008, clean-air rules in [California](#) virtually halved the concentrations of black-carbon soot in the state's skies, in effect reducing the state's carbon footprint by the equivalent of cutting carbon dioxide emissions by 21 million tons a year, according to new analysis.

That would represent about 5 percent of the state's CO<sub>2</sub> emissions in 2009, according to the report. Though the data have yet to be fed into global climate models to see if California's results can be replicated elsewhere, they bolster the hope that focusing on black-carbon soot could be an effective way to begin to address global warming.

During the past decade, atmospheric scientists have focused increasing attention on black-carbon soot, the tiny particles found in Diesel exhaust as well as the emissions from wood and dung fires. The soot, which absorbs sunlight and re-radiates it as heat, has edged out methane as the second most-abundant greenhouse-agent released into the atmosphere by human activities. But unlike carbon dioxide or methane, soot takes only days or weeks to settle out of the atmosphere, compared with decades to centuries for methane and CO<sub>2</sub>.

This has led some scientists to conclude that by focusing near-term emissions reductions on global soot, in addition to other shorter-lived warming agents such as methane and ozone, humanity could slow the expected rate of global warming during the next several decades.

Last year, for instance, a study by NASA's Goddard Institute for Space Studies in New York suggested that such controls could reduce warming expected by 2050 by about 0.5 degrees Celsius, or about 1 degree Fahrenheit. That is a significant amount, given the international interest in ensuring that global temperatures don't increase by more than 2 degrees C by 2100, compared with preindustrial levels.

The study released Thursday marks the first time researchers have been able to measure the climate-related effects of long-term reductions in black-carbon soot over a region, the research team says. Until now, scientists have had to rely on limited field studies and computer simulations to estimate such effects.

Estimates of how large an effect soot controls could have on global warming will have to wait until models chew over the new data. But the report's lead author is willing to hazard an educated guess.

"I'm speculating that it could cut down the rate of warming by 15 percent" over the near term, says Veerabhadran Ramanathan, a researcher at the Scripps Institution of Oceanography in La Jolla, Calif. He worked with researchers from the University of California at San Diego and from national laboratories in California and Washington State.

Others are a bit more cautious, noting that the effects could vary widely, based on regional differences in atmospheric circulation patterns as well as population density and predominant sources of soot.

Still, the study represents a landmark in efforts to understand the impact of emission-control efforts, according to Yan Feng, a researcher at the Argonne National Laboratory in Argonne, Ill., who helped craft the proposal for the study three years ago but did not take part in the execution of the study.

The study is noteworthy for its comprehensiveness, combining long-term measurements from the ground and from satellites with computer modeling, she notes.

Funded by the California Air Resources Board, it focuses on emissions from Diesel engines, which have been a focus of California air-pollution control efforts. While the study highlights the reductions in black-carbon soot concentrations since 1989, it also points out that concentrations have fallen some 90 percent since the 1960s, even as Diesel-fuel use has increased fivefold.

In addition, it notes that the Diesel story in California is nuanced. Diesel emissions include not only black-carbon soot, which can heat the surrounding air, but also aerosol particles such as sulfates, which reflect sunlight and can cool the atmosphere.

As more efficient Diesel engines came into wider use, and other emission-reduction measures were implemented, emissions of black-carbon soot declined but emissions of cooling aerosols remained the same. The continued presence of the cooling aerosols was crucial. If both types of aerosols declined, the net effect likely would be warming.

This finally demonstrates in the real world what climate models have suggested – that reducing black-carbon soot would have a net cooling effect, says Dr. Ramanathan.

"This is geoengineering made in heaven," he says, referring to proposals to moderate global warming by injecting cooling aerosols into the atmosphere.

The team holds that curbing emissions of black-carbon soot is critical for limiting global warming over the next 50 years. While black-carbon soot has natural sources, such as wildfires, these are sporadic compared with the constant replenishment from human activity.

Efforts to rein in global warming beyond 50 years still rely on reducing CO<sub>2</sub> emissions. Because of CO<sub>2</sub>'s long residence time in the atmosphere, those reductions need to start soon, researchers say.

The team also found that so-called brown carbon soot, most common as the smoldering white smoke following wildfires or when crop residue burns, is not a cooling agent, as previously believed. The team discovered that brown-carbon soot is a warming agent. In the team's study, this brown-carbon soot accounted for about 15 to 25 percent of the atmospheric heating attributed to soot. Current climate models don't account for this, suggesting that models underestimate the warming effects of brown-carbon soot in regions where biomass burning is common.

Overall, the team estimates that the decline in black-carbon soot over California likely cooled the state by about 0.1 degrees C. But Ramanathan puts little stock in the number because it's so small as to get lost in the noise of natural variations in the state's climate. And it comes from only one model. The figure would have more statistical significance if it resulted from multiple runs of several models.

Still, the results are encouraging enough to provide added fodder for a meeting scheduled for October between experts from California and [India](#) to what, if anything, in California's approach can be applied to India's considerable black-carbon-soot problem.

Posted: <http://www.csmonitor.com/Environment/2013/0613/Study-raises-hope-of-combating-global-warming-by-reducing-soot>

###



**Black Carbon Emissions Cut 90% in California; Model for Polluted Mega Cities of the World (Fast climate mitigation possible from controlling diesel engines; extra warming from previously ignored brown carbon also confirmed)**

BY Erin Tulley – June 13, 2013

In a first-of-its kind study examining the impact black carbon has on climate in California, researchers found the state's efforts to reduce air pollution, particularly from diesel engines, has cut black carbon concentrations by 90% since 1966, without any noticeable disruption to the lives of the citizens of California, but with tremendous benefits to their health, as well as to climate protection. Concentrations have decreased by 50% since the late 1980's, which is equivalent to reducing 21 million metric tons of carbon dioxide annually or the same as taking 4.1 million cars off California's streets every year.

The 3-year study, funded by the California Air Resources Board and led by Scripps Distinguished Professor of Climate and Atmospheric Sciences Veerabhadran Ramanathan, was conducted by the University of California San Diego, Lawrence Berkeley National Laboratory at UC Berkeley, and the U.S. Department of Energy's Pacific Northwest National Laboratory, and is the first-of-its-kind comprehensive regional assessment of the climate impact of black carbon on the Golden State.

Researchers used California's extensive network of air pollution monitors as well as aircraft, satellites and computer models to study black carbon — tiny black particles released into the atmosphere from burning fossil fuels, wood, and waste. Black carbon is now recognized as the second leading cause of global warming, behind only carbon dioxide. It also is a major public health threat, killing an estimated six million people every year around the world, and making countless more millions sick with respiratory and cardio-vascular illnesses.

California's controls on emissions from diesel engines beginning in the 1970's is in large part responsible for the dramatic reduction of black carbon in the state, although controls on other sources in the transport sector as well as industrial sources, and decreased burning of wood and waste, are also likely contributors. While the controls were put in place to improve public health, a co-benefit of reducing emissions of this major component of soot, according to the study, has been to slow the pace of climate change.

"We know that California's programs to reduce emissions from diesel engines have helped clean up the air and protect public health," said CARB chairman Mary D.

Nichols. “This report makes it clear that our efforts to clean up the trucks and buses on our roads and highways also help us in the fight against climate change.”

Significantly, the study found that co-emitted pollutants such as sulfates and organic carbon did *not* decrease at the same time as the black carbon. Many of these co-emitted pollutants reflect light back into the atmosphere causing cooling that can offset some of the warming caused by black carbon. These results support a growing body of evidence that mitigation of black carbon emissions, particularly from diesel engines, can provide fast mitigation of global warming.

The study also found that brown carbon — a type of organic carbon that is typically ignored in climate models — is also a potent warming agent, offsetting up to 60 to 90% of the cooling caused by other lighter organic carbons. Brown carbon is emitted primarily from sources such as forest fires and residential wood burning, which previous studies believed to have negligible climate effect, or even a cooling effect. The results from the California study indicate that reducing emissions from these sources may also provide a benefit to climate mitigation.

“If California’s efforts in reducing black carbon can be replicated globally, we can slow down global warming in the coming decades by about 15 percent, in addition to protecting people’s lives,” Ramanathan said. “It is a win-win solution, if we also mitigate CO2 emissions simultaneously.”

“Reducing black carbon globally, along with other short-lived climate pollutants, including methane, tropospheric ozone, and hydrofluorocarbons, or HFCs, can cut the rate of global warming in half and the rate of warming in the Arctic by two-thirds over the next few decades,” said Durwood Zaelke, President of the Institute for Governance & Sustainable Development. “It also can save millions of lives every year, and significantly reduce crop damage.”

Efforts are already underway to phase down HFCs under the Montreal Protocol, a treaty that has already phased out nearly 100 similar chemicals by nearly 100%. U.S. President Obama and Chinese President Xi reached an [agreement](#) last week to work together to reduce HFCs using the Montreal Protocol.

“Success like this in California and with HFCs builds the momentum and confidence we need to address all sources of climate pollution, including carbon dioxide from energy production,” Zaelke added. “Enlisting national air pollution laws and institutions, and institutions like the Montreal Protocol is the fastest and most secure way to get climate protection.”

Posted: [http://www.enn.com/press\\_releases/4162](http://www.enn.com/press_releases/4162)

###



# Truckinginfo

## **CARB Report Claims Success With Diesel Emissions Regulations**

BY Truckinginfo Staff – June 13, 2013

Reductions in emissions of black carbon since the late 1980s, mostly from diesel engines as a result of air quality programs, have resulted in a measurable reduction of concentrations of global warming pollutants in the atmosphere, according to a new study from the California Air Resources Board.

The study, funded by CARB and led by Veerabhadran Ramanathan of the Scripps Institution of Oceanography at the University of California, San Diego, estimates that reductions in black carbon as a result of clean air regulations were equivalent to reducing carbon dioxide emissions in California by 21 million metric tons annually, or taking more than 4 million cars off California roads every year.

“We know that California’s programs to reduce emissions from diesel engines have helped clean up the air and protect public health,” said CARB chairman Mary D. Nichols. “This report makes it clear that our efforts to clean up the trucks and buses on our roads and highways also help us in the fight against climate change.”

Critics of CARB, including those in trucking, say the agency has taken too tough a stance in trying to regulate diesel emissions, which has led to higher prices for goods moved by truck, along with forcing some trucking operations out of business due to the high costs of compliance.

Black carbon, which are the tiny soot particles released into the atmosphere by burning fuels, has been linked by CARB to adverse health and environmental impacts and also notes it is one of the major short-lived contributors to climate change. The major sources of black carbon in California are diesel-burning mobile sources, residential wood burning in fireplaces and heaters, agricultural burning and wildfires.

The three-year-study, titled *Black Carbon and Regional Climate of California*, was conducted by UC San Diego and the U.S. Department of Energy’s Lawrence Berkeley National Laboratory and Pacific Northwest National Laboratory. CARB says it is the first comprehensive regional assessment of the climate impact of black carbon on California. In conducting the study, scientists used computer models and air pollution data collected by aircraft, satellite and ground monitors.



CARB claims the study's results support a growing body of scientific evidence that suggests it is possible to immediately slow the pace of climate change regionally by reducing emissions of short-lived climate pollutants, like black carbon.

Study co-author Dr. Tom Kirchstetter of LBNL, says black carbon levels have decreased by about 90% over a 45-year period, beginning with the establishment of CARB in 1967. Researchers say they found the state's efforts to reduce diesel emissions to have lessened the impact of global warming on California, supporting earlier theoretical computer modeling that reducing black carbon from diesel combustion is a potent 'climate cooler.'

The reductions occurred during a time when diesel fuel consumption increased by about a factor of five, CARB says, attesting to the effectiveness of its regulations requiring cleaner fuels and vehicle technology.

A copy of the report can be found on the [CARB website](#).

Posted: <http://www.truckinginfo.com/news/story/2013/06/carb-report-claims-success-with-diesel-emissions-regulations.aspx?prestitial=1>

###



## **ARB claims diesel engine controls reducing climate change impact in California**

BY Frank Maccioli – June 14, 2013

The [California Air Resources Board \(ARB\)](#) yesterday [announced](#) that the results of [a new study](#) show that the state's regulations to control diesel engine emissions are also benefitting [climate change](#) efforts.

The project was led by Dr. Veerabhadran Ramanathan of the Scripps Institution of Oceanography at the University of California, San Diego, in conjunction with the U.S. Department of Energy's Lawrence Berkeley National Laboratory and Pacific Northwest National Laboratory. The study estimated that the black carbon reductions from air regulations also reduced carbon dioxide emissions by 21 million metric tons annually.

That's equivalent to removing more than 4 million cars from California's roads every year.

According to co-author Dr. Tom Kirchstetter of LBNL, black carbon levels have decreased by about 90 percent over a 45-year period, beginning with the establishment of [ARB](#) in 1967, mostly as a result of state regulations for diesel engine emissions. The reductions occurred during a period of time when diesel fuel consumption increased by a factor of five.

The study looked at emissions and other data throughout California, including Kern County and the San Joaquin Valley.

“We know that California’s programs to reduce emissions from diesel engines have helped clean up the air and protect public health,” said ARB chairman Mary D. Nichols. “This report makes it clear that our efforts to clean up the trucks and buses on our roads and highways also help us in the fight against climate change.”

Black carbon consists of soot particles from the combustion of fuels and other sources. In addition to adverse health effects, the particles have both a warming effect (due to heat absorption) and a cooling effect (due to reflection of sunlight). However, ARB said that this study also showed that the cooling effect predominates and supports growing evidence that it is possible to immediately slow the pace of climate change regionally by reducing emissions of short-lived pollutants like black carbon.

“If California’s efforts in reducing black carbon can be replicated globally, we can slow down [global warming](#) in the coming decades by about 15 percent, in addition to protecting people’s lives,” Ramanathan said. “It is a win-win solution if we also mitigate carbon dioxide emissions simultaneously.”

Posted: <http://www.examiner.com/article/arb-claims-diesel-engine-controls-reducing-climate-change-impact-california>

###

# Green Car Congress

*Energy, Technologies, Issues and Policies for Sustainable Mobility*

## **Study finds that California clean diesel programs have slashed black carbon, a powerful short-term contributor to global warming**

BY Green Car Congress Staff – June 14, 2013

In California, reductions in emissions of black carbon since the late 1980s—mostly from diesel engines as a result of air quality programs—have resulted in a measurable reduction of concentrations of global warming pollutants in the atmosphere, [according](#) to a study examining the impact of black carbon on California's climate.

The study's results support a growing body of scientific evidence that suggests it is possible relatively quickly to slow the pace of climate change regionally by reducing emissions of short-lived climate pollutants, like black carbon.

The study, funded by the California Air Resources Board (ARB) and led by Dr. Veerabhadran Ramanathan of the Scripps Institution of Oceanography at the University of California, San Diego, estimates that reductions in black carbon as a result of clean air regulations were equivalent to reducing carbon dioxide emissions in California by 21 million metric tons annually or taking more than 4 million cars off California roads every year. The reductions occurred during a time when diesel fuel consumption increased by about a factor of five.

*If California's efforts in reducing black carbon can be replicated globally, we can slow down global warming in the coming decades by about 15 percent, in addition to protecting people's lives. It is a win-win solution if we also mitigate carbon dioxide emissions simultaneously.*

—Dr. V. Ramanathan

Black carbon—tiny soot particles released into the atmosphere by burning fuels—has been linked to adverse health and environmental impacts through decades of scientific research. It is also one of the major short-lived contributors to climate change. The major sources of black carbon in California are diesel-burning mobile sources, residential wood burning in fireplaces and heaters, agricultural burning and wildfires.

Black carbon has the effect of warming the atmosphere because it is effective at absorbing sunlight. However, it is emitted together with a range of other particle pollutants, including organic carbon, sulfur and other chemicals, some of which have a

cooling effect, typically by reflecting sunlight. Reducing diesel emissions can therefore lead to a reduction of both warming and cooling particles.

The report, however, is the first to confirm, based on both observations and computer modeling, that the warming effect of black carbon dominates, overwhelming any cooling effect of other pollutants. This confirms the positive impact reducing diesel emissions has on fighting climate change.

*...for regions like California, where mitigation policies have historically targeted primarily fossil fuel sources leading to a large decrease in atmospheric BC, the climate benefits of direct forcing reduction has masked the net warming due to greenhouse gases by a measurable fraction (estimated to be 5% of the CO<sub>2</sub> warming potential). This climate benefit dates back to at least the 1960s, and is currently ongoing. Brown carbon, emitted from residential wood burning is found to be another attractive target for policy makers seeking to combat anthropogenic climate change.*

—“Black Carbon and Regional Climate of California”

The 3-year-study, titled “Black Carbon and Regional Climate of California,” was conducted by UC San Diego and the US Department of Energy’s Lawrence Berkeley National Laboratory (LBNL) and Pacific Northwest National Laboratory (PNNL). It is the first comprehensive regional assessment of the climate impact of black carbon on California. In conducting the study, scientists used computer models and air pollution data collected by aircraft, satellite and ground monitors.

According to co-author Dr. Tom Kirchstetter of LBNL, black carbon levels have decreased by about 90% over a 45-year period, beginning with the establishment of CARB in 1967, mostly as a result of state regulations for diesel engine emissions. Researchers found the state’s efforts to reduce diesel emissions to have lessened the impact of global warming on California, supporting earlier theoretical computer modeling by Dr. Mark Jacobson of Stanford University that reducing black carbon from diesel combustion is a potent climate cooler.

The study took a conservative approach in examining the impact black carbon has on the Golden State. Researchers considered emissions only from diesel-powered trucks and buses, and off-road diesel equipment and vehicles to estimate the equivalent reduction of carbon dioxide.

When all sources of black carbon emissions from diesel fuel combustion are considered, including farming and construction equipment, trains and ships, the reduction in carbon dioxide emissions can be as high as 50 million metric tons per year over the past 20 years. That’s roughly equal to a 13% reduction in the total annual carbon dioxide emissions in California.

The study found that co-emitted pollutants such as sulfates and organic carbon did not decrease at the same time as the black carbon. Many of these co-emitted pollutants

reflect light back into the atmosphere causing cooling that can offset some of the warming caused by black carbon. These results support a growing body of evidence that mitigation of black carbon emissions, particularly from diesel engines, can provide fast mitigation of global warming.

The study also found that brown carbon—a type of organic carbon that is typically ignored in climate models—is also a potent warming agent, offsetting up to 60 to 90% of the cooling caused by other lighter organic carbons. Brown carbon is emitted primarily from sources such as forest fires and residential wood burning, which previous studies believed to have negligible climate effect, or even a cooling effect. The results from the California study indicate that reducing emissions from these sources may also provide a benefit to climate mitigation.

In addition, they study found that black carbon particles increased the number of drops of water in clouds, while decreasing the size of those drops, a condition that can reduce or delay rain.

Posted: <http://www.greencarcongress.com/2013/06/bc-20130614.html>

###



## **Scripps: Black Carbon Levels Linked To Climate Change Declining**

BY Maureen Cavanaugh – June 14, 2013

The effort to clean up California's air may be helping slow down climate change.

A new [study](#) commissioned by the [California Air Resources Board](#) finds that the reduction of [black carbon](#), or soot levels since the 1980s is comparable to taking 4 million cars off the roads of California.

The study examining the impact of black carbon on the state's climate was led by professor of climate and atmospheric sciences [Veerabhadran Ramanathan](#) at [Scripps Institution of Oceanography](#), UC San Diego.

## Air Resources Board News Media Digest – ARB Reduces Black Carbon Emissions

"If California's efforts in reducing black carbon can be replicated globally, we can slow down global warming in the coming decades by about 15 percent, in addition to protecting people's lives," said [Ramanathan](#).

Posted: <http://www.kpbs.org/news/2013/jun/13/scripps-black-carbon-levels-linked-climate-change/>

###